



(11)

EP 1 728 479 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.12.2006 Bulletin 2006/49

(51) Int Cl.:
A61B 17/17 (2006.01)

(21) Application number: **05104737.1**

(22) Date of filing: **01.06.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL BA HR LV MK YU

• **Bernhard, Andreas**
2554 Meisberg (CH)

(71) Applicant: **Stryker Trauma SA**
2545 Selzach (CH)

(74) Representative: **Liebetanz, Michael et al**
Isler & Pedrazzini AG,
Patentanwälte,
Postfach 6940
8023 Zürich (CH)

(72) Inventors:
• **Baumgartner, Thomas**
4552 Derendingen (CH)

(54) **Quick-release guide for elements of a fixation system external to bone**

(57) A quick-release guide assembly (10) for an external fixation system comprises a device body (10, 13) with at least one hole (14) and a handle portion with a handle bar. The device body (10, 13, 20) comprises at least one appendage (11, 12) having a first connecting portion (20). The handle comprises a complementary

second connecting portion, wherein one connecting portion comprising a spring actuated locking pin, wherein an actuator knob is provided to release the locking pin. Therefore the connecting portions of the handle can be releasably attached to the device body (10, 13, 20), enabling a quick change of device bodies (13) having different oriented and arranged holes (14).

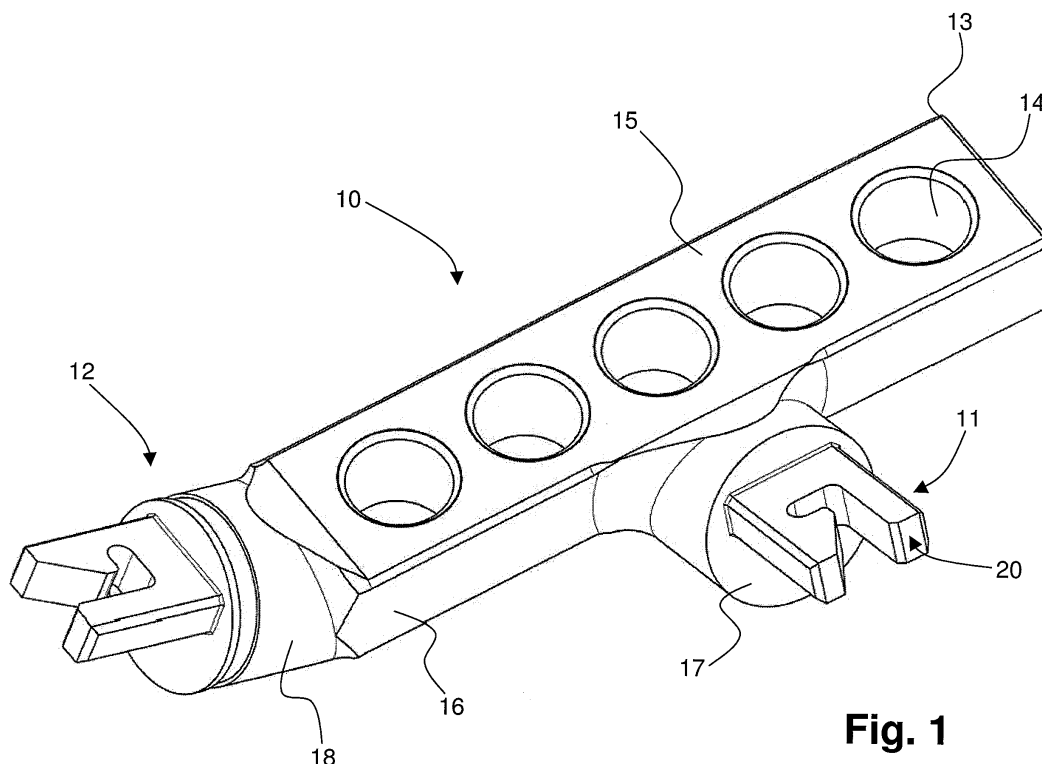


Fig. 1

Description

Technical field of the invention

[0001] The invention relates to a quick-release guide assembly for elements of or used for an external fixation system.

[0002] The use of surgical fixation systems for a variety of orthopedic applications is widely accepted. Plates are used by surgeons to stabilize or align a patient's bone as well as alter compression of patient's bones. Such plates are then fastened to the bones with a plurality of fasteners such as screws that are installed through holes in the plate. However beside plates such elements to be guided are e.g. drills, taps, screws, pins, other fasteners or instruments.

[0003] Each fixation pin should properly align with its associated pin clamp hole so that each pin is seated correctly with the external fixation system and enters the bone at an appropriate angle. Any misalignment of the pin within the pin clamp hole may result in an unstable or insecure connection of the external fixation system, e.g. a plate, to the bone, thus potentially defeating the usefulness of the external fixation system.

Prior art

[0004] It is known in the field to use drill guides to improve the quality and accurateness of the drilled bores in view of the external fixation system to be used. Such a drill guide is known from WO 2005/016128.

[0005] Another drill guide is known from EP 0 229 676. Said drill guide is manipulated through use of a handle which is releasably connected to the drill structure for manipulating the shell.

[0006] Said handle structure includes a tip end portion constructed and arranged to releasably fit within either one of the bushings comprising the drill guide structure. Each bushing includes an open-ended slot, and a key on the outside of the tip end portion of the handle structure mates within the slot when the handle is fitted into one of the bushings. This overall structural relationship properly positions the handle structure relative to the drill guide and additionally prevents relative rotation.

[0007] The known device has the drawback that one of the holes on the surface of the drill guide plate is used to hold the handle and cannot be chosen for drilling a hole. Furthermore, the proximal end of the handle has an axis substantially perpendicular to the plane of the drill guide structure and may be inconvenient for the surgeon to use a drill in this environment.

[0008] Furthermore, hospitals are often interested to provide one single handle for different applications to be able to gain room in a sterilization box, reducing costs. Surgeons are interested to use guide assemblies, wherein elements can be connected more flexibly to follow the room requirements within the framework of an chirurgical intervention and to optimize the handling for the user.

Summary of the invention

[0009] Based on this prior art it is one object of the invention to provide an improved handle drill guide with a releasable handle.

[0010] For this purpose, according to the invention, the drill guide is characterized through the features of the claims.

Short description of the drawings

[0011] The invention will be explained in greater detail by means of a description of exemplary embodiments, with reference to a drawing containing the following figures:

- Fig. 1 is a perspective view of a drill guide without handle according to one embodiment of the invention,
- Fig. 2 is a plan view of a hook of the drill guide of Fig. 1,
- Fig. 3 is a side view of the drill guide of Fig. 1,
- Fig. 4 is a perspective view of a handle of the drill guide according to Fig. 1,
- Fig. 5 is a cross-section view of a sleeve of the handle of Fig. 4, and
- Fig. 6 is a plan view of a drill guide without handle according to another embodiment of the invention.

Description of exemplary embodiments

[0012] Features and advantages of the present invention in addition to those mentioned above will become apparent to those skilled in the art from a reading of the following detailed description.

[0013] Fig. 1 shows schematically a drill guide 10 having two coupling appendages 11 and 12. The drill guide 10 comprises a body 13 being fitted with five through holes 14. The body 13 is e.g. a brick-like parallelepiped with the holes 14 oriented in one row. Number, location and orientation of the holes 14 depend from the specific application of the drill guide. The holes 14 of the drill guide 10 are oriented perpendicular or inclined to the surface 15 and are internally threaded. Surface 15 is per definition the upper surface of the drill guide 10, i.e. the surface opposite to the bone of the patient to be treated.

[0014] Two coupling appendages 11 and 12 are attached to body 10. The first appendage 11 is attached to a side surface 16 in the middle of the longer side of the drill guide 10. The second appendage 12 is attached to one of the shorter side surfaces of the drill guide 10. In other embodiments there may be provided only one or three or even four appendages on different sides or on every side surface of the body 13.

[0015] Each appendage 11 or 12 comprises an intermediary bar 18 with an abutment surface 17 on which is provided a hook 20. The main axis of the bar 18 is inclined compared to the upper surface 15 of the body 10. The

inclination is such that the abutment surface 17 and the hook 20 are oriented away from the underside 19 (see Fig. 3) of the drill guide body 13, i.e. the side opposite to the surface 15.

[0016] Fig. 2 shows schematically a plan view on one of the hooks 20 of the drill guide 10 of Fig. 1. Same features receive in all Figs. the same reference numerals. The body of hook 20 comprises a basic engagement section 21, extending on one side into a counter web 22 with the form of a rounded parallelepiped or pin. The web 22 is provided opposite to the retaining nose 23 having the same length over the abutment surface 17. Between the nose 23 and the web 22 there is a tapering slit 24, opening past the nose 23 into a transverse oriented locking slot 25. The inclination of the tapering angle is 30 degrees but can also be chosen preferably between 5 and 60 degrees. The length of nose 23 and web 22 are such that the slit 24 starts with a width of e.g. more than 4.5 millimeter, narrowing towards approximately 2 millimeter, i.e. less than a half of the initial spacing; wherein the locking slot 25 has a width of approximately 4.5 millimeter and a depth of approximately 2 millimeter. These dimensions are adapted for the handle 30 shown in Fig. 3 to be used in connection with a body 13 with a length of approximately 60 millimeters and a width of approximately 14 millimeters; it is clear that other dimensions of the device can be contemplated. It is preferred that the length of the locking slot 25 is at least the double of the width of said locking slot 25, i.e. a pin 41 to be inserted in said slot 25 can be lodged completely behind the nose 23.

[0017] Fig. 3 is a side view of the drill guide 10 from the side surface opposite to appendage 12. It can be seen from Fig. 3 that the underside 19 of the body 13 is prolonged into the underside 29 of appendage 12. This creates a larger underside surface. In other embodiments the intermediary bar 18 can also be chosen to be purely cylindrical.

[0018] Hook 20 is mounted, preferably in one piece with the bar 18, in such a way that the prolongation of the underside 28 of web 22 or nose 23 crosses the underside 19 of the body 13 at the median line 26 of the said body 13. This brings the hook 20 in an eccentric position on the abutment surface 17.

[0019] Fig. 4 is a perspective view of a handle 30 of the drill guide 10 according to Fig. 1. The handle 30 comprises a handle bar 31 and a sleeve end portion 32. The two portions 31 and 32 may be provided in one piece but the handle bar 31 can be mounted on a core of the end portion 32.

[0020] The sleeve portion 32 comprises an actuator knob 33 which can be pushed against the action of a spring 34 shown in Fig. 5. The movement of actuator knob 33 is possible along an axis 35 perpendicular to the longitudinal axis 36 of the handle bar 31. It can be seen from Fig. 4 that handle bar 31 is flattened on opposite sides 37 and that the actuator surface of knob 33 is mainly oriented to the plane of the flattened side surfaces 37, e.g. parallel.

[0021] The sleeve end portion 32 ends opposite to the handle bar 31 in an abutment surface 38. Abutment surface 38 is provided to abut against surface 17 of intermediary bar 18. The sleeve end portion 32 comprises a rectangular slot 39 provided to receive hook 20 of the drill guide 10. As mentioned in connection with Fig. 3 hook 20 is eccentric to the axis of intermediary bar 18 as is slot 39.

[0022] The sleeve end portion 32 furthermore comprises two inspection slits 40 within which one and the same perpendicular oriented pin 41 can be seen. These features disclosing the operation of knob 33 are better shown in Fig. 5.

[0023] Fig. 5 is a cross-section view of sleeve 32 of the handle 30. The main axis 35 of knob 33 is located below the slit 39. The bottom of knob 33 comprises a transverse bore to accommodate the locking pin 41. The end surface of the knob 33 pushes against a spring 34, supported on the other side against the bottom of a guiding bore along axis 35. The locking pin 41 within the bore of the knob 33 avoids that the knob 33 can be pushed out of the guiding bore. The bore comprising the spring 34 can be greater than the width of the guiding slit 42, although the bottom of the guiding bore usually provides enough guiding force for the spring 34. Additionally the bottom of the knob can be formed as a cone to guide the end helix of the spring 34.

[0024] Between the two opposite inspection slits 40 is provided a through-going guiding slit 42 receiving the locking pin 41. Therefore a portion of the locking pin 41 is always blocking the slit 39. In this context locking pin 41 has a distance from front surface 38 of the handle 30 and locking slit 25 has a distance from abutment surface 17 of appendage 11 or 12 so that, upon contact of the two abutment surfaces 38 and 17, pin 41 engages into the locking slit 25.

[0025] When handle 30 is positioned on the appendage 11 or 12 so that the abutment surfaces 17 and 38 are brought together, pin 41 glides within the guiding slit 42 from the idle position, shown in Fig. 5, where it is located opposite to nose 23, over the inclined surface 27 against the force of the spring 34 until pin 41 snaps back within the locking slot 25. The drill guide 10 with attached handle 30 is then usable by a surgeon. When the drill guide has to be changed or switched, then the surgeon activates the knob 33 and separates handle 30 from the drill guide body 13 through bringing the pin 41 against the force of the spring 34 in the locking slot 25 in a position to be liberated.

[0026] Fig. 6 is plan view of a drill guide 50 without handle 30 according to another embodiment of the invention. The drill guide 50 comprises a drill guide body 13 being shorter than the body of drill guide 10. There are four holes 54 in two groups of two holes 54. The two appendages 11 and 12 allow attaching a handle 30 on the longer or shorter side of the body 13. In other embodiments there may be inclined holes or holes of different diameter. The holes can be through going bores with

smooth surfaces or they can be threaded over a portion or completely.

[0027] Although the description of the drawings always mention a drill guide, it is clear, that such a quick-release guide assembly can also be used for other elements of or used for an external fixation system. These parts can be taps, screws, pins or other fastener elements. The external fixation system can comprise a plate of other elements for which the guide can be used for.

[0028] Handle 30 is preferably made in aluminium, stainless steel, plastic or titanium. The same applies to items with the reference numerals 31 to 41 beside the spring 34, preferably made in stainless steel. The drill guide 10 is preferably made in aluminium, stainless steel, plastic or titanium or alternatively in PEEK (polyether ether ketones) to obtain X ray transparency or carbon fibers.

Reference numerals

[0029]

10	drill guide
11	appendage
12	appendage
13	body
14	bore
15	upper surface
16	side surface
17	abutment surface
18	intermediary bar
19	underside
20	hook
21	engagement section
22	web
23	nose
24	narrowing slit
25	locking slot
26	median line
27	inclined surface
28	underside of web
29	underside of appendage
30	handle
31	handle bar
32	sleeve end portion
33	actuator knob
34	spring
35	axis of the actuator knob
36	longitudinal axis of the handle bar
37	flattened side surfaces
38	abutment surface
39	rectangular slot
40	inspection slit
41	pin
42	guiding slit
50	drill guide
54	grouped holes

Claims

1. Quick-release guide assembly (10, 30) for elements of or used for an external fixation system, comprising

- a device body (10, 13) with at least one hole (14), and
- a handle portion (30) with a handle bar (31) and a connecting portion (32), which can be releasably attached to the device body (10, 13, 20),

characterized in that the device body (10, 13, 20) comprises at least one appendage (11, 12) having a first connecting portion (20), **in that** the handle (30) comprises a complementary second connecting portion (32, 39), one connecting portion (32) comprising a spring (34) actuated locking pin (41), wherein an actuator knob (33) is provided to release the locking pin (41).

2. Guide assembly according to claim 1, wherein the appendage (11, 12) is inclined to point away from the underside (19) of the device body.

3. Guide assembly according to claim 2, wherein the underside (29) of the appendage (11, 12) is flush with the underside (19) of the device body (13).

4. Guide assembly according to one of claims 1 to 3, comprising two, three or four appendages (11, 12) on the different sides of the device body (13), preferably mounted in the middle of each side of said device body (13).

5. Guide assembly according to one of claims 1 to 4, wherein the first connecting portion comprises a hook (20) and second connecting portion (32) comprises a slit (39) adapted to receive the hook (20).

6. Guide assembly according to claim 5, wherein the hook (20) is mounted, preferably in one piece with the bar (18), in a way that the prolongation of the underside (28) of the hook (20, 22, 23) crosses the underside (19) of the device body (13) at the median line (26) of the device body (13).

7. Guide assembly according to claim 5 or 6, wherein the hook (20) comprises a nose portion (23) and a opposing web (22) defining a tapering slit (24), opening behind the nose (23) into a locking slit (25).

8. Guide assembly according to claim 7, wherein the second connecting portion (32) comprises a pin (41) oriented perpendicular to the hook receiving slit (39), wherein a guiding slit (42) is provided in the plane comprising the pin (41) and perpendicular to the plane of the receiving slit (39) to enable a transverse

movement of the pin (41) in the guiding slit (40), wherein a bore is provided parallel to the hook receiving slit (39) and centered within the width of the guiding slit (42) to accommodate, on the other side towards the mouth of the bore, an actuator knob (33), having a bore to encompass the pin (41), and, on the side towards the end of the bore, a spring (34) to push the pin (41) in his idle position against the wall of the guiding slit (42) near the actuator knob (33).

9. Guide assembly according to one of claims 1 to 8, wherein the guide assembly is a drill guide assembly and/or the elements of the external fixation system are from the group encompassing a drill, a tap, a screw, a pin, fixation elements, or instruments.
10. Method to attach elements of an external fixation system using a quick-release guide assembly (10, 30) for elements of or used for said external fixation system according to one of claims 1 to 9, comprising the steps of

- providing a device body (10, 13) with at least one hole (14) for an element of the external fixation system, and
- providing a handle portion (30) with a handle bar (31) and a connecting portion (32) comprising an actuator knob (33),

wherein the handle portion can be releasably attached to the device body (10, 13, 20) through at least one appendage (11, 12) of the device body (10, 13) having a first connecting portion (20) and the handle (30) comprising a complementary second connecting portion (32, 39), wherein one of the connecting portions (32) comprises a spring (34) actuated locking pin (41), wherein said actuator knob (33) is pushed to release the locking pin (41) to separate the device body (10, 13) to be replaced from the handle portion (30) maintained in hand to connect a different device body.

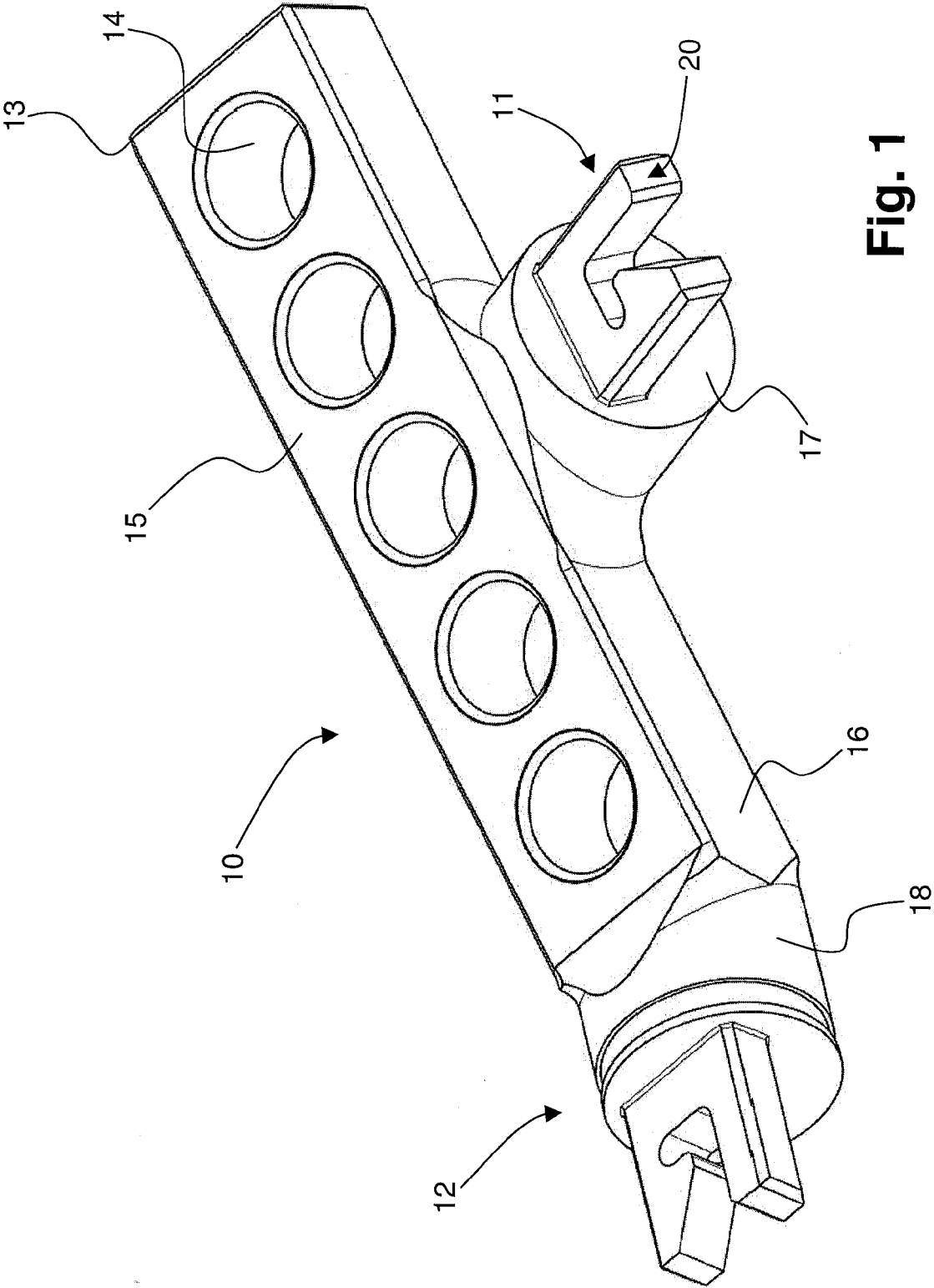


Fig. 1

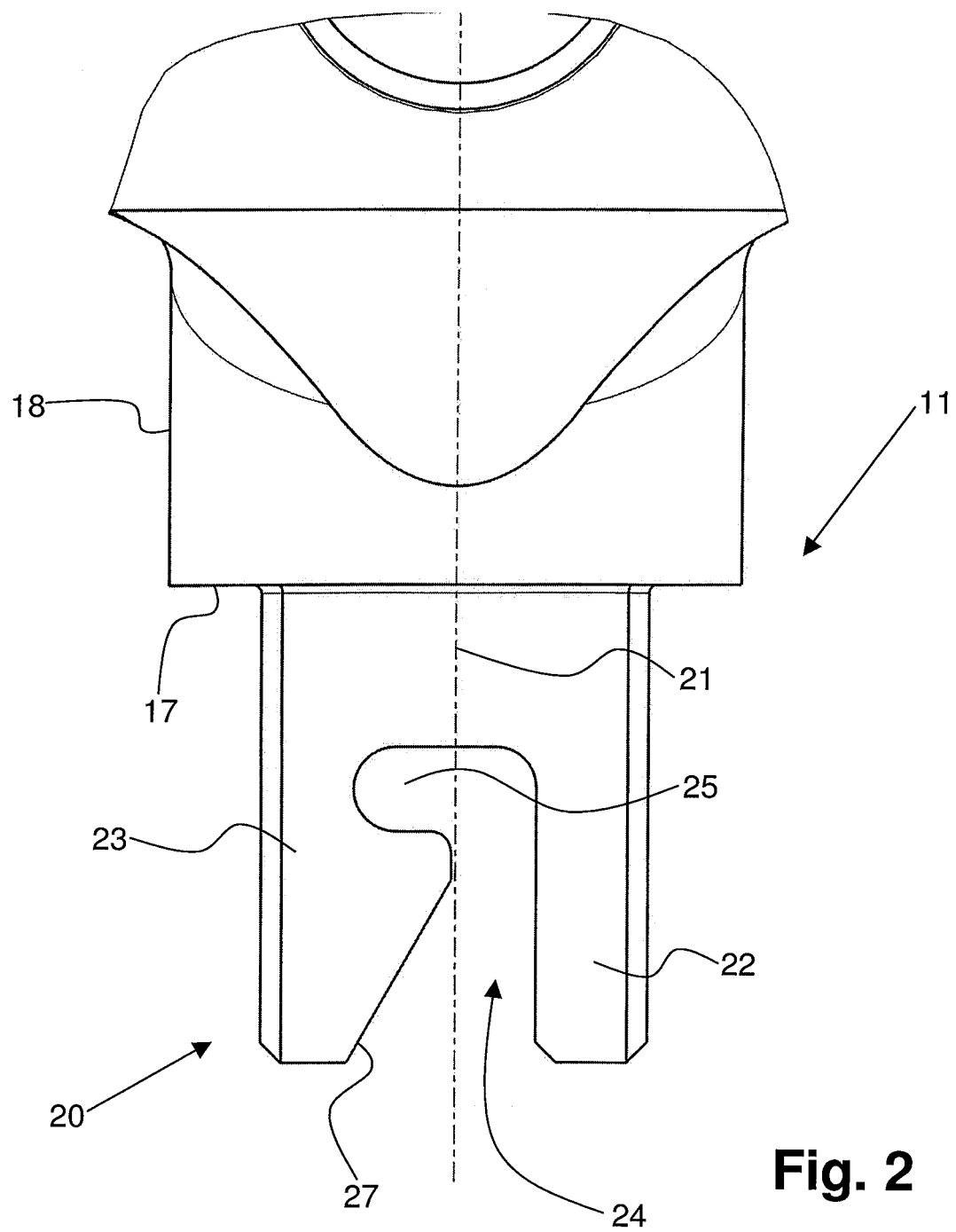


Fig. 2

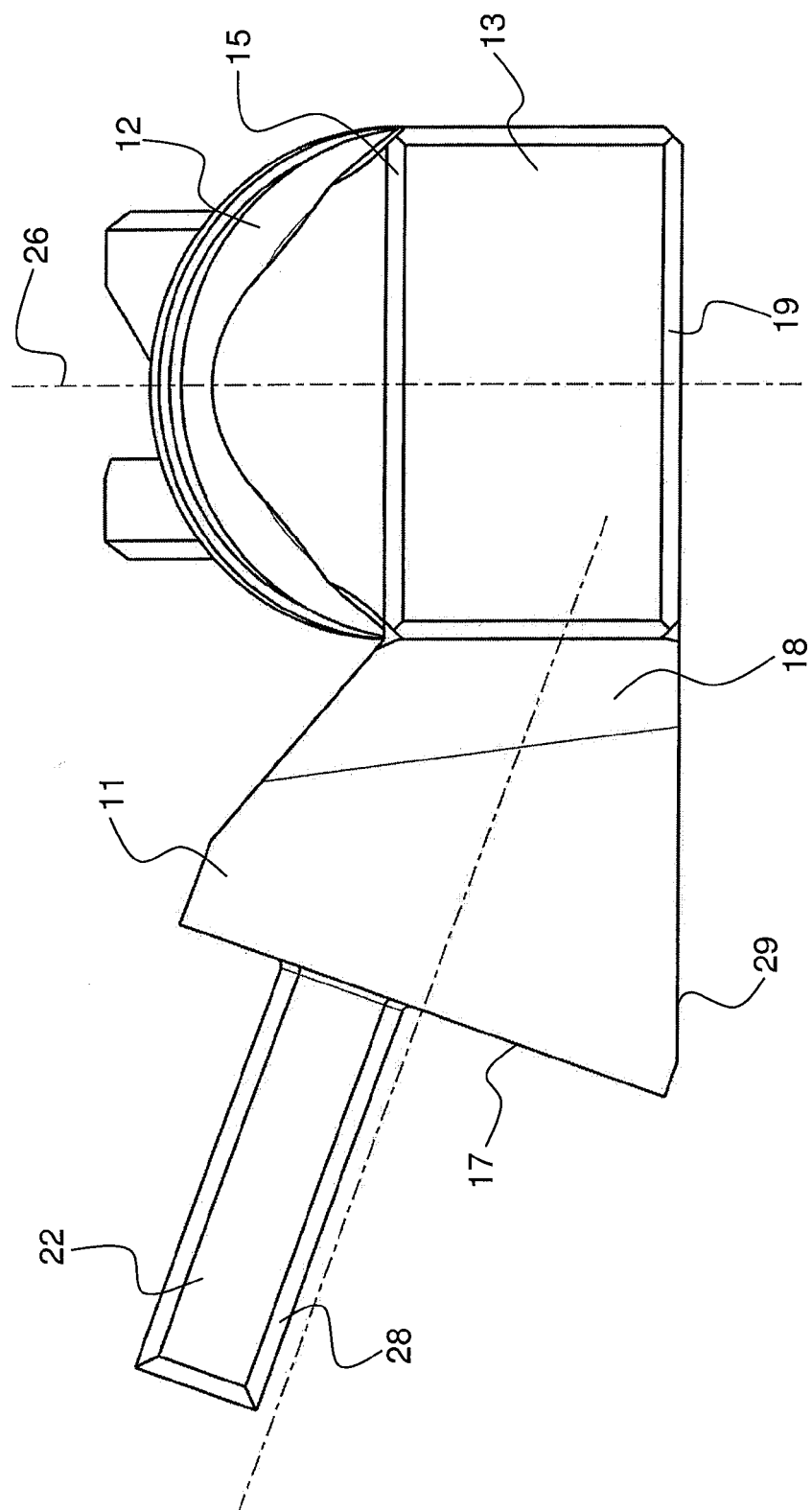


Fig. 3

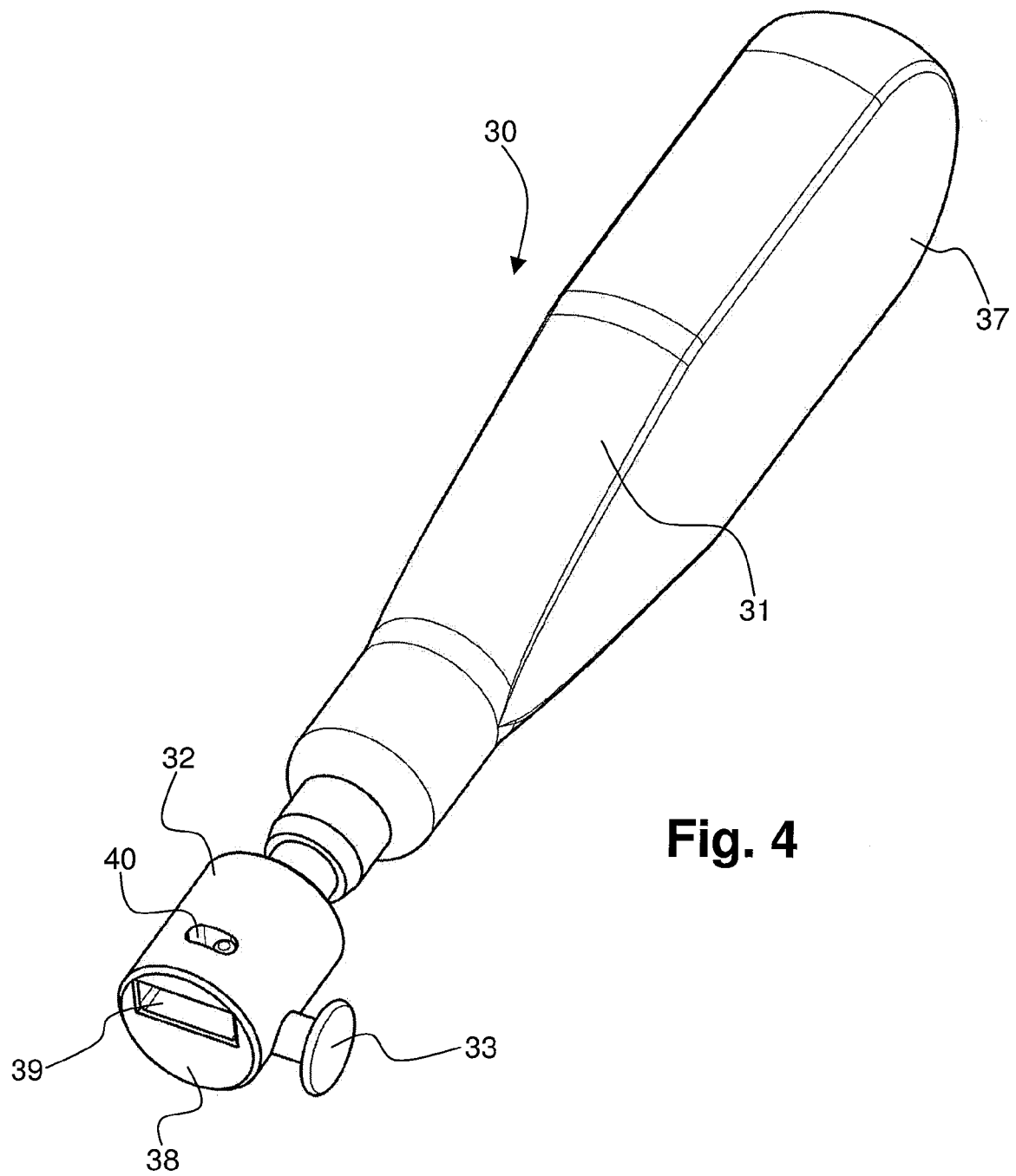


Fig. 4

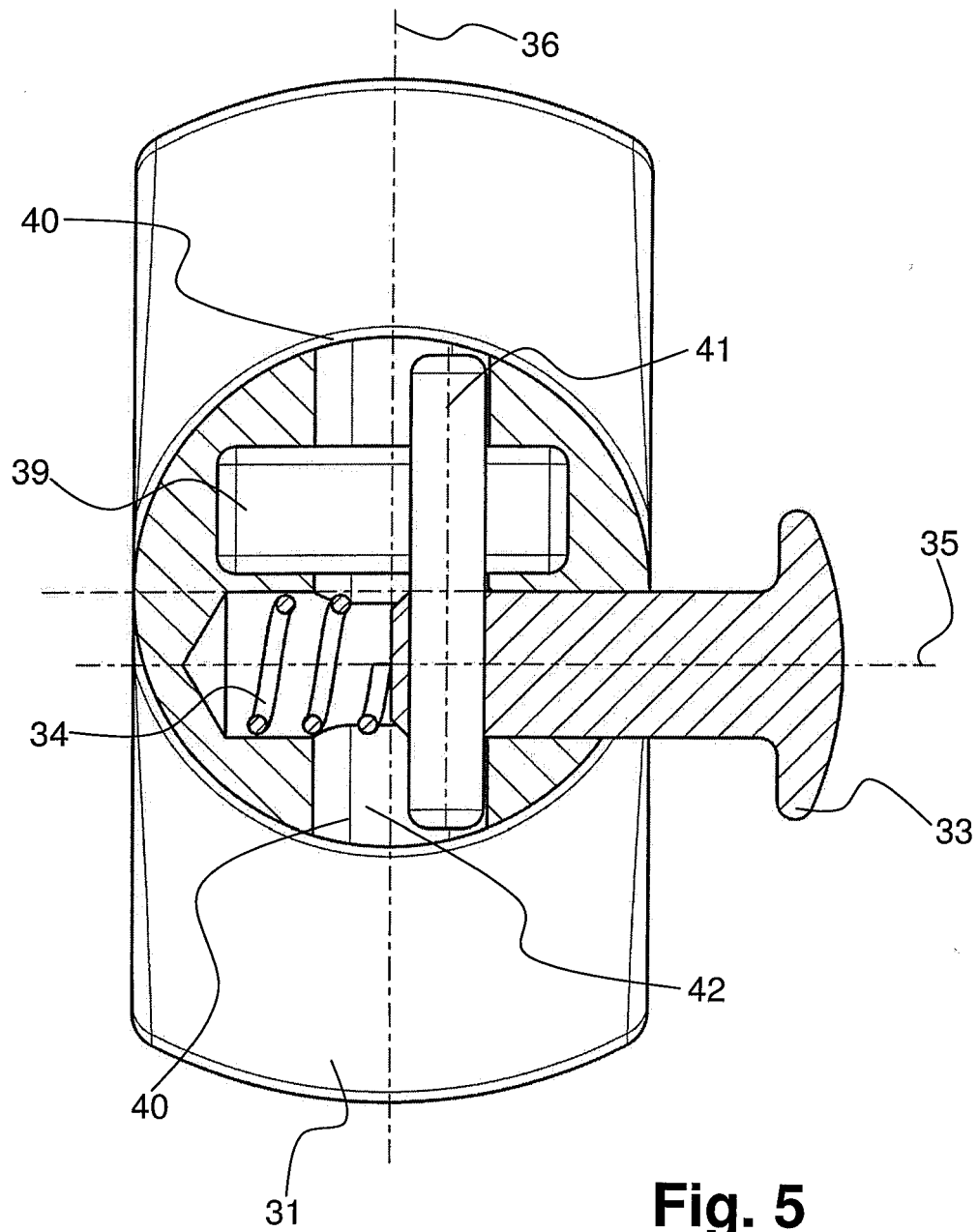


Fig. 5

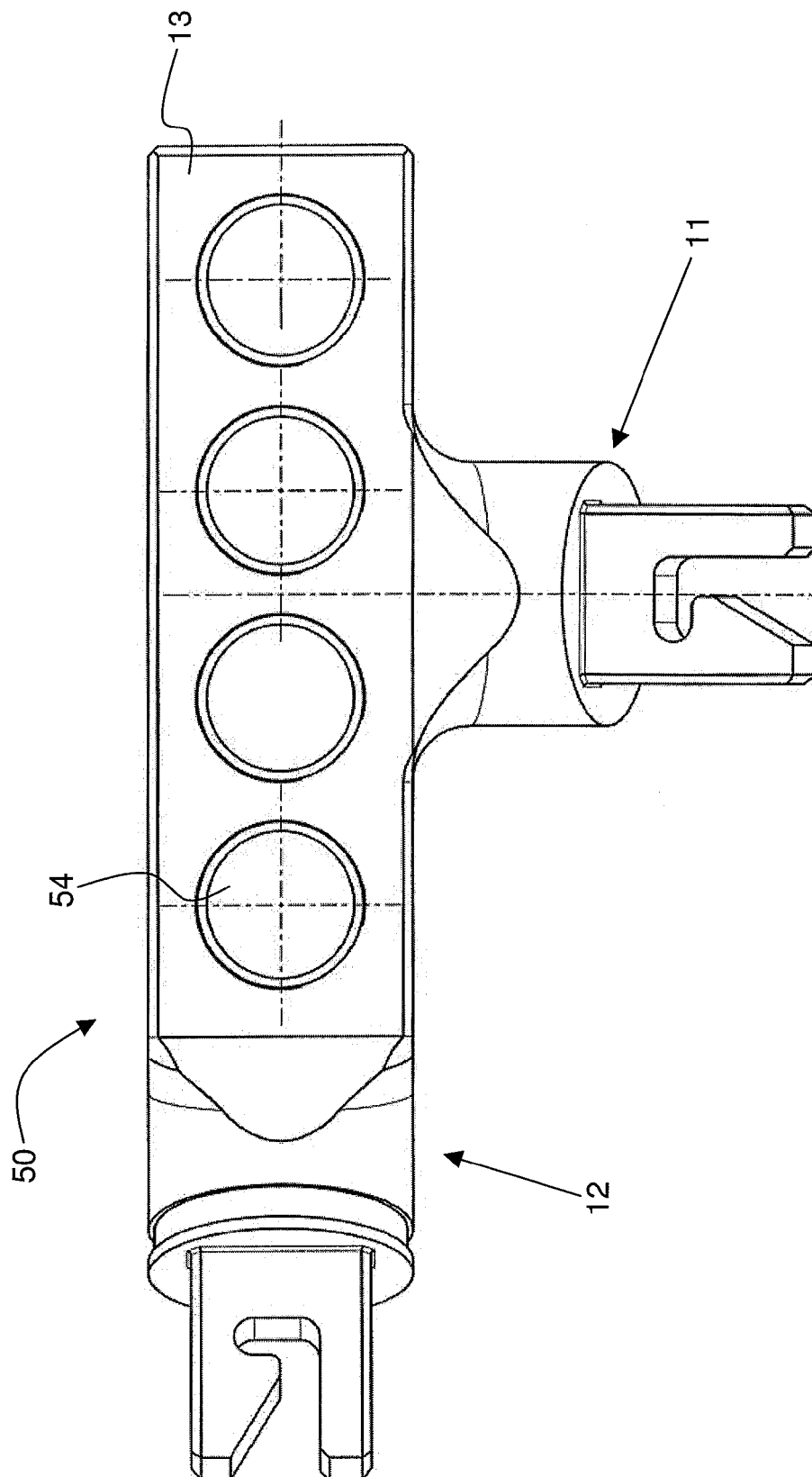


Fig. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 4737

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 780 092 A (JOHNSON & JOHNSON PROFESSIONAL) 25 June 1997 (1997-06-25) * column 2, line 22 - line 36 * * column 3, line 17 - line 54 * * column 4, line 2 - line 33 * * column 4, line 37 - column 5, line 54 * * figures 1,6 * -----	1-6,9,10	A61B17/17
D,A	US 5 851 207 A (CESARONE M.D.) 22 December 1998 (1998-12-22) * abstract * -----	1-6,9,10	A61B
D,A	EP 0 229 676 A (PFIZER HOSPITAL PRODUCTS) 22 July 1987 (1987-07-22) * claims 1-4; figures 1-4,10 * -----	1,4,9,10	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A61B
Place of search		Date of completion of the search	
The Hague		1 November 2005	
		Examiner	
		Nice, P	
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

3
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 10 4737

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

01-11-2005

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0780092	A	25-06-1997	CA	2193449 A1	22-06-1997
			DE	69624079 D1	07-11-2002
			DE	69624079 T2	06-03-2003
			JP	9289999 A	11-11-1997
			US	5690636 A	25-11-1997

US 5851207	A	22-12-1998	AT	263510 T	15-04-2004
			AU	719525 B2	11-05-2000
			AU	8628598 A	25-01-1999
			CN	1261773 A	02-08-2000
			DE	69823030 D1	13-05-2004
			DE	69823030 T2	10-03-2005
			WO	9901072 A1	14-01-1999
			EP	0993275 A1	19-04-2000
			ES	2215316 T3	01-10-2004
			JP	2002507140 T	05-03-2002
ZA	9805284 A	11-01-1999			

EP 0229676	A	22-07-1987	CA	1235348 A1	19-04-1988
			DE	3472368 D1	04-08-1988
			DE	3483748 D1	24-01-1991
			EP	0140642 A2	08-05-1985
			ES	292577 U	16-06-1986
			JP	1788986 C	10-09-1993
			JP	4071548 B	16-11-1992
			JP	60108045 A	13-06-1985
US	4528980 A	16-07-1985			

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2005016128 A [0004]
- EP 0229676 A [0005]